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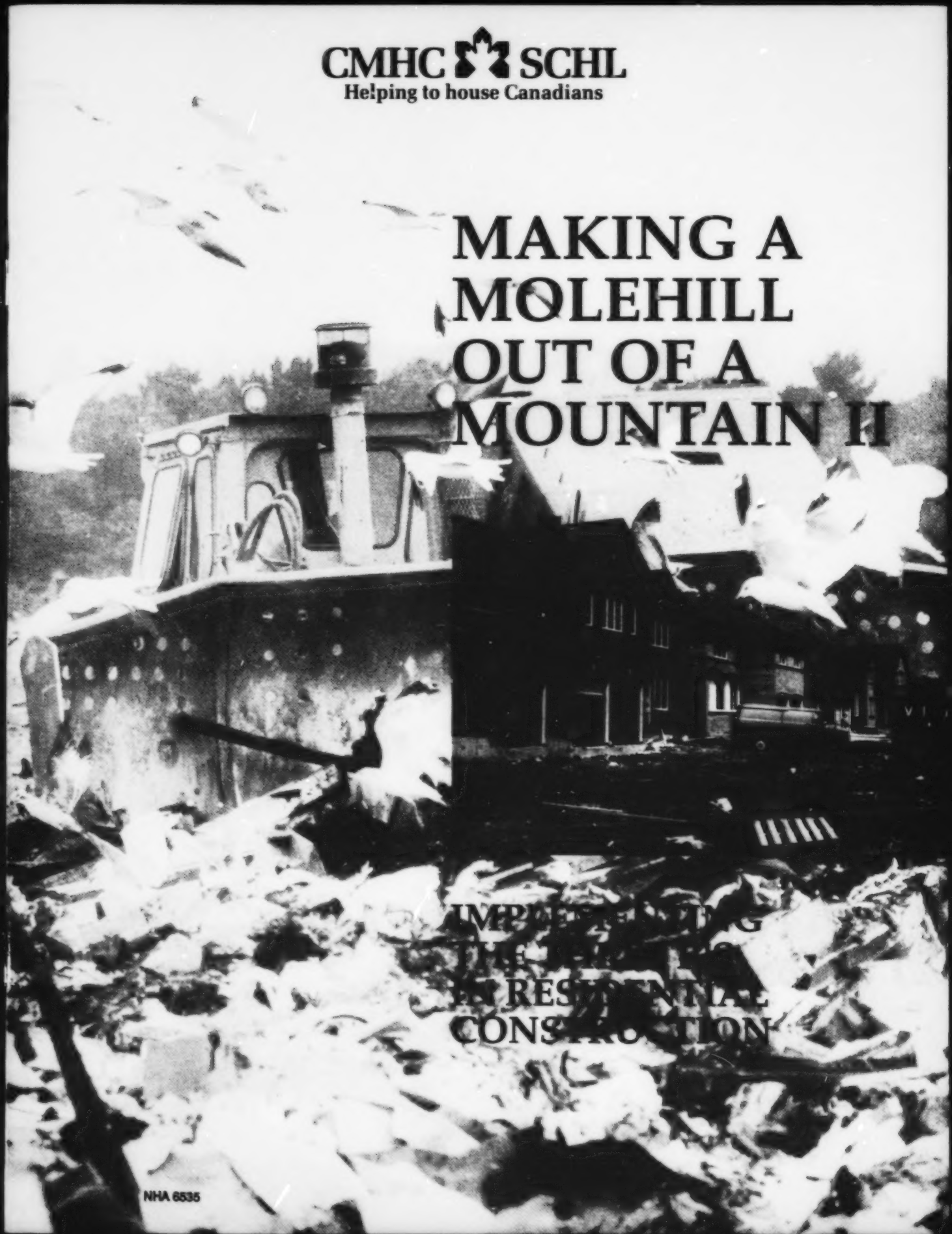
MAKING A MOLEHILL OUT OF A MOUNTAIN II



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THE
IN RESIDENTIAL
CONSTRUCTION

NHA 6535

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MAKING A MOLEHILL OUT OF A MOUNTAIN II

IMPLEMENTING THE THREE R'S IN RESIDENTIAL CONSTRUCTION

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Cette publication existe aussi en français sous le titre :
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Mise en application des 3R dans la construction résidentielle — LNH 6536

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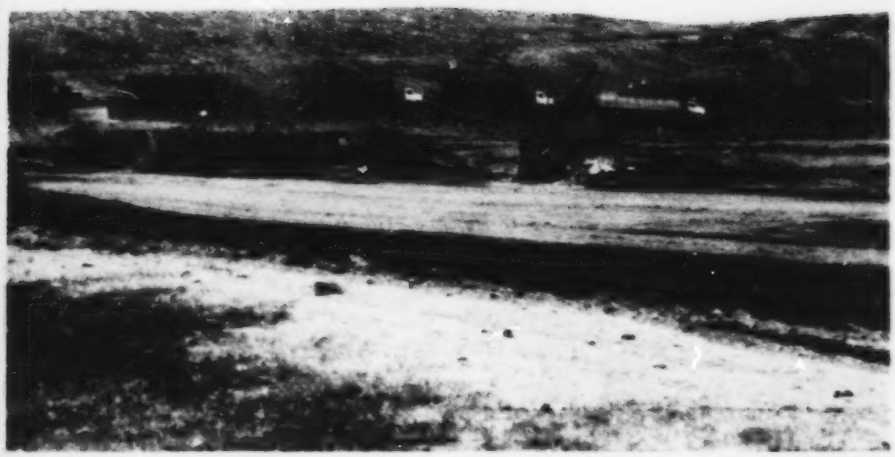
INTRODUCTION

There is little doubt that construction waste has become a problem in almost every area of the country. Bans and restrictions on certain types of materials are already in place, and more are being considered all the time. There are even indications that *waste audits* and *waste management plans* may become necessary components of the renovation and construction process.

This book represents one of the first steps taken by the building industry to meet the issue of waste management in a proactive manner — to find solutions before the problem gets out of hand. It is an acknowledgement of both the construction industry's role in creating waste, and its responsibility for cleaning up.

This book centres around three primary concepts: reducing waste at source; reusing what would normally be landfilled; and recycling materials for which there is no immediate reuse. Not all of the answers are here of course. The notion of construction waste management is a new one. It will take some trial and error before the right mix of solutions is in place. What is presented is a likely vision of the future, and some roadmaps to guide you as you work out answers for your particular company in your particular region of the country.

GARBAGE, GARBAGE, GARBAGE



THE PROBLEM

As Canadians, we generate more garbage per capita than any other country. Garbage that's produced in our factories, our offices and our homes. Garbage that's sometimes relatively clean and even reusable, and garbage that's sometimes highly toxic — requiring attention and care for decades.

All of this garbage is placing a stress on our environment — filling up landfill sites and polluting soils and water supplies. For too long, we have believed that we've all the space required to dump whatever we please. But in fact, we're running out of room to put our garbage.

Finding new locations for landfill is increasingly difficult and will be increasingly costly. After all, not many Canadians want a dump in their backyard. In addition, new dumps are undergoing much more rigorous evaluation and assessment to ensure their long-term acceptability. Tougher environmental protection requirements will result in better, but more expensive, disposal techniques.

Governments at all levels across the country are promoting and enforcing a reduction in the amount of materials being landfilled. Major initiatives are underway to reduce the amount of wastes currently being produced:

- ***A National Packaging Protocol has been set to reduce packaging volumes by 25 percent across the country;***
- ***Blue box household and office recycling programs have been instituted in most parts of the country; and***
- ***In Ontario, industries must submit Waste Reduction Action Plans demonstrating how they can reduce wastes by 25 percent by the end of 1992, and by 50 percent by the year 2000.***

While garbage must be viewed by all Canadians as a major problem, it's equally important to see it as an opportunity — an opportunity to improve our approach to the use of resources, and an opportunity to capitalize on the benefits of sound waste management.

THE ROLE OF THE RESIDENTIAL CONSTRUCTION INDUSTRY

The residential construction industry is a major contributor to the waste stream. The demolition of buildings to make way for new housing units, the renovation of our aging housing stock, and the wastes produced in the construction of new homes is estimated to represent more than five percent of the total volumes of wastes currently taken to landfill sites. Non-residential demolition and construction represents a further nine percent.

In many parts of the country, the wastes produced by the construction industry have been targeted. Restrictions on what can and cannot be dumped at landfill sites are becoming more commonplace.

These bans represent a real challenge. By meeting the challenge head on, the residential construction industry can show governments that it can be part of the solution, and show consumers that their environmental concerns are reflected in better building practices.

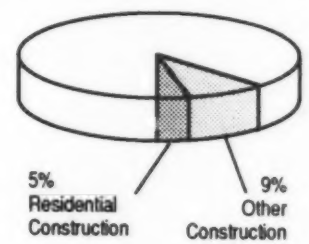
OPPORTUNITIES

Putting a sound waste management plan into place holds a number of potential financial benefits for the home builder and renovator. Assessing operations and improving procedures in an effort to cut back on the amount of wastes slated for landfill can:

- ***reduce the cost of materials purchased for a project;***
- ***reduce haulage and tipping fees associated with the project; and***
- ***create a source of revenue through the resale of used goods and materials.***

Not all of the benefits resulting from improving waste management procedures are strictly monetary. Integrating waste management into company procedures will:

- ***improve efficiency through altered demolition and construction practices;***
- ***improve the energy-efficiency of the building envelope by reducing the amount and types of materials through which heat loss can occur; and***
- ***improve the company's public image by demonstrating a responsibility towards the environment.***



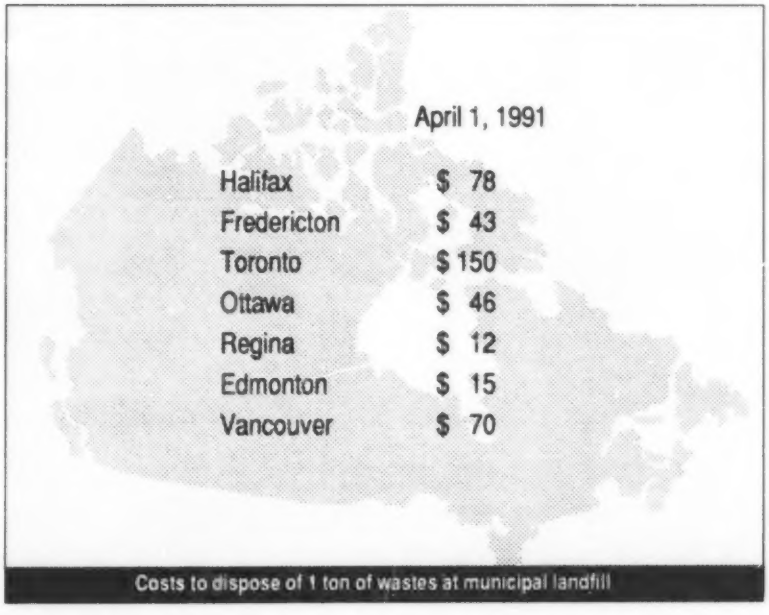
Wastes Taken To Landfill

MATERIALS BANNED FROM DISPOSAL
• Corrugated Cardboard
• Fine Paper
• Scrap Metal
• Clean Wood
• Clean Fill, Concrete & Rubble
• Petroleum Contaminated Soil
• Usable Off specification & Surplus Goods
White Goods
Drywall
Tires (Maximum 5 per load)
• Allowable limit per load until June 30, 1991 is 25%, and 0% as of July 1, 1991
INQUIRE AT WEIGHSCALE FOR LIST OF DEPOTS FOR RECYCLABLE MATERIALS

A WASTE MANAGEMENT PLAN

As with the introduction of any new procedures and operations in a construction company, a formal plan must be put in place. The plan, in turn, must be guided by an overall goal, and include specific objectives that will enable the company to meet its goal. In some instances across the country, governments have imposed waste reduction goals. In other areas, the building company should establish its own goals.

A waste reduction plan is built around the three R's of waste management: REDUCE, REUSE, AND RECYCLE. Before that plan can be set into action, however, there is a need to account for a fourth R — REVIEW.



Costs to dispose of 1 ton of wastes at municipal landfill

REVIEW

The review is the foundation of a sound waste management plan. The review involves an in-depth look at current demolition and construction waste management practices in order to find out:

- ***what kinds of waste (and what volumes) are being produced through your operations;***
- ***how the wastes are currently collected and stored — and at what cost;***
- ***how and where your wastes are being disposed; and***
- ***what your costs are for haulage and tipping fees.***

The quantities of waste produced — and the costs associated with disposal — will vary depending on the type of activity being performed on a given site, the local construction practices and municipal regulations and fees governing waste disposal. The chart, opposite, suggests the range of costs found across the country to dispose of 1/2 metric tonne (1 ton) of mixed construction wastes at the municipal landfill. The costs are those in place as of April 1,1991. In all cases, they are expected to rise significantly as existing sites reach their capacity.

Demolition of existing buildings and houses to make room for new or infill housing is the largest contributor to the waste stream. Demolishing a single house can fill as many as five 40-yard dumpsters.

A typical **renovation** is a contradiction in terms. No job is identical, and therefore the waste streams will vary from job to job. However, as an example, one job might involve some demolition and some new construction. For a typical kitchen renovation and small addition, two to three containers — four to six metric tonnes (8-12 tons) — of waste is considered typical. In some parts of the country, renovators allocate *five to eight percent* of the total job cost to disposal.

New construction requires only small amounts of disposal of existing materials — primarily those materials involved in site preparation. Yet still, as much as 1-1/4 metric tonnes (2 1/2 tons) of wastage of new products brought to the site are produced in the construction of an average house. The costs of disposing of this waste can represent up to four percent of total house construction costs in some Canadian municipalities.

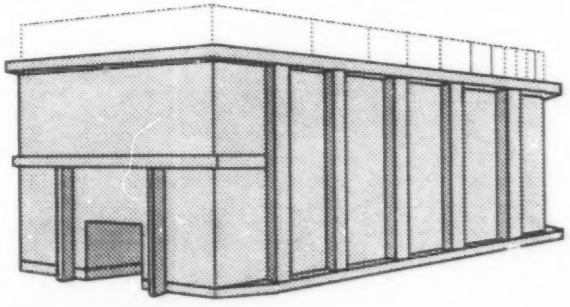
The chart, opposite, identifies typical wastes produced in the construction of a 186 m² (2,000 ft², two-storey house in Central Canada.

REVIEWING MUNICIPAL REGULATIONS

As existing landfill sites become increasingly strained, and as alternative uses for what was once considered waste become available, restrictions on what can be dumped are being put in place.

As part of the **review** phase of your Waste Management Action Plan, you must make yourself aware of current restrictions in your area of operations. Most regions and/or municipalities across the country currently have Waste Management Co-ordinators on staff. They can represent a valuable source of information to the construction company. Make certain that your company is on mailing lists that detail current regulations and costs.

25% Dimensional Lumber
15% Manufactured Wood
12% Drywall
10% Masonry and Tile
10% OCC (Cardboard)
6% Asphalt
5% Fibreglass
5% Other Wastes
4% Metal Wastes
4% Plastic and Foam
4% Other Packaging



Per cent by volume of residential construction wastes

PERFORMING A WASTE AUDIT

Performing an audit of your current waste management practices and procedures is the foundation of a Waste Management Action Plan. You need to know what wastes are produced and at what cost.

Performing a waste management audit is not a complex operation. It involves tracking what ends up in the bins on-site over a period of time long enough to tell you what waste your company's average construction job produces. For a small builder, that may mean tracking only one or two houses. For a large builder, it may mean tracking wastes for a period of months. For a renovator, it may mean tracking a number of jobs until a picture emerges of the amount and type of wastes that are typical for you.

The following section will help you set up a waste audit procedure by providing you with specific direction as well as a number of ready-to-use-charts to help you track wastes and costs. The more thoroughly they are completed by your site personnel, the greater your ability will be to develop appropriate solutions.

The charts have been designed to track the waste contents of one bin. You will need to make photocopies for additional bins; and new audit sheets will be required each time a bin is emptied. If you are source separating materials already, then one chart can be used to track several bins for one collection period only. As much as possible, keep track of the different construction phases by starting a new chart as a new phase begins. This will further help you target your waste reduction strategy by zeroing in on those operations that produce the most waste.

Separate checklists have been provided for the new home builder and for the renovation contractor.

New Construction Waste Audit Chart

Job Location _____

Bin #	Bin Size	Material Composition	Per Cent Vol.	Weight	Tipping Fee	Other Notes
		Dimensional lumber Plywood, subfloor, sheathing Masonry / concrete Drywall Metal Plastics / vinyl (packaging, drain tile, plumbing) Foam insulations Fibreglass Corrugated cardboard Hazardous wastes (paints, sealants, solvents) Textiles (carpets, wall paper, etc.) Organics (food waste, leaves, dirt, etc.) Other (list)				Date Sheet Number Construction Phase

Renovation Waste Audit Chart

Job Location _____

Date _____

Specifics	Materials Composition	% by Volume	% by Weight (if available)
Bin Number _____ Date Emptied _____ Percent Full _____ Weight _____ Tipping Fee _____	dimensional lumber manufactured wood asphalt masonry drywall insulation interior doors exterior doors windows cabinets plastic piping copper or lead piping cardboard packaging electrical metal fixtures: - bathtub - toilet - sink textiles: - carpet - wall paper hazardous wastes: - paints - sealants - solvents		

REDUCE, REUSE AND RECYCLE

Once you have a grip on the types, amounts and costs of wastes that your operations are producing, you can begin to find better ways to manage that waste through reduction, reuse and recycling.

REDUCE

Of those three options, reduction is the most efficient and most effective, because reduction implies producing less waste to begin with. Reducing the production of wastes should be viewed as sound business. Less waste means less materials purchased, and less materials to dispose of — and that means savings directly to the company.

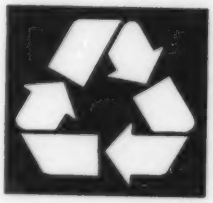
Wastes can be reduced in a variety of manners. First and foremost, by using materials more efficiently, less waste is produced. For example:

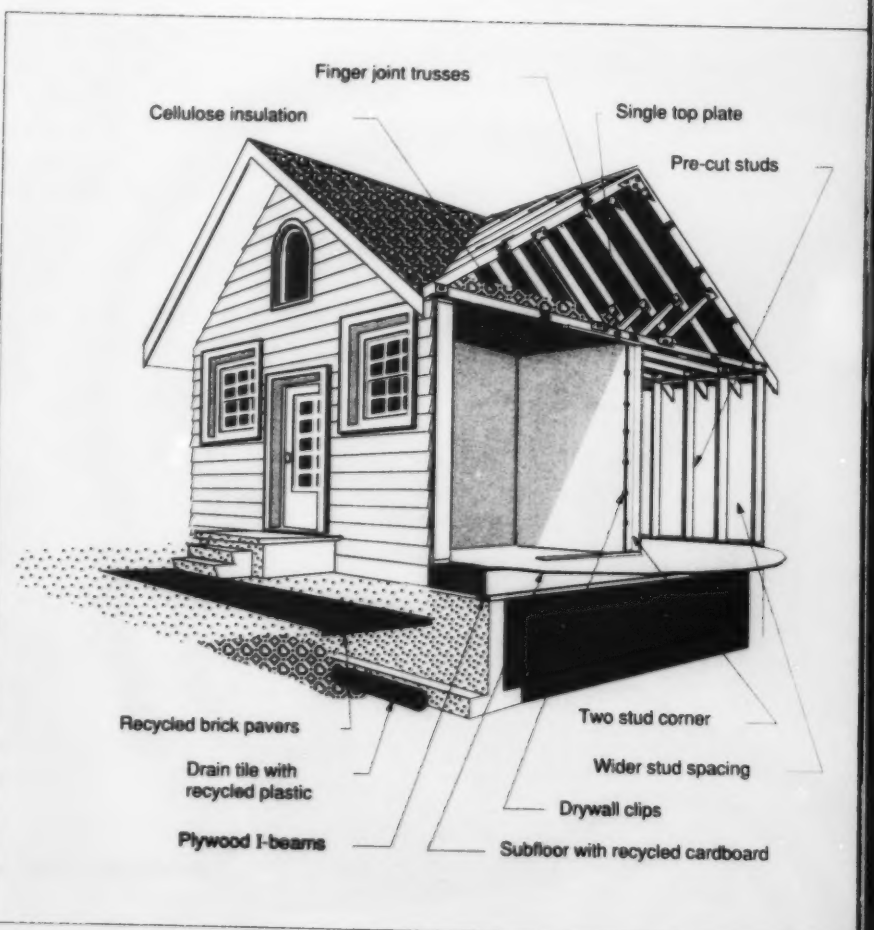
- ***At the site-clearing stage — leaving trees, or where that's not possible, chipping roots and branches on-site;***
- ***At the design stage — altering floor plan designs to optimize the use of purchased materials and eliminate redundant materials; and***
- ***During construction — improving materials storage procedures to reduce material wastage through exposure to the elements.***

Second, waste volumes can be reduced through smart purchasing and handling practices by:

- ***Reducing the amount of packaging left at the site by suppliers;***
- ***Purchasing materials, such as fasteners, paint, caulking and drywall mud in bulk containers; and***
- ***Buying more durable materials, such as kiln-dried wood, to reduce the amount of material lost to warpage and shrinkage.***

Finally, using materials that are either entirely or partially made of recycled materials is considered a reduction strategy. Using recycled materials reduces that amount of virgin material that needs to be harvested — and consequently, reduces the amount of virgin material that ends up as landfill. The number of recycled construction materials is growing at a tremendous rate.





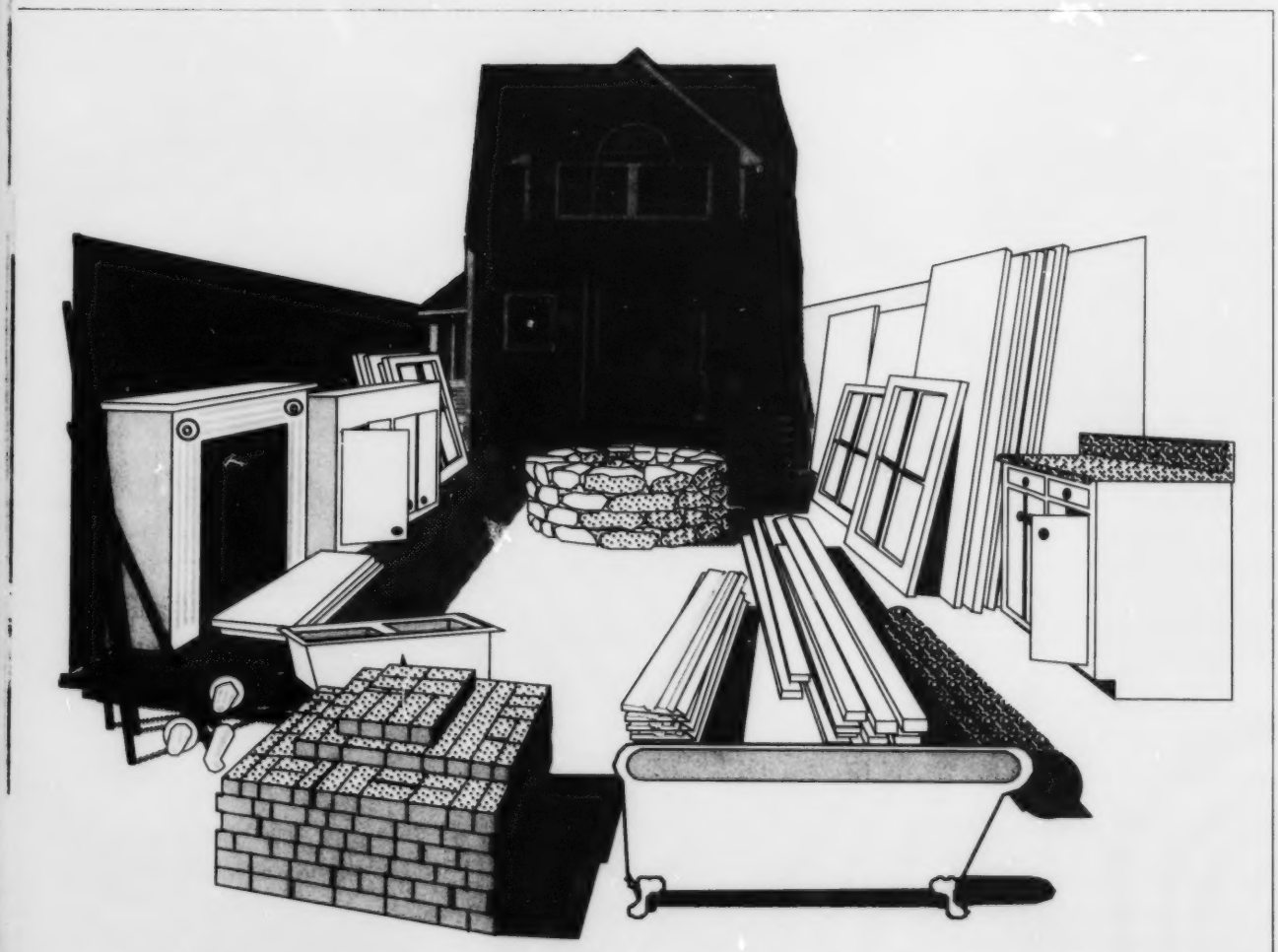
REUSE

Reuse is the second most important of the three R's. Reuse means increasing efficiency in the construction process — reusing materials that would normally be thrown into the disposal bin.

For renovators, the concept of reuse is particularly appealing. Careful demolition practices will provide a host of articles with a useful lifespan, ranging from doors,windows and decorative mouldings, to older sinks and tubs. These can either be sold from the site, sold to salvage companies or sold through specialty stores.

Reuse of materials on a new construction site is a common practice. Off-cuts from framing lumber are often reused as bridging, blocking or forming stakes. Excess insulation from exterior walls can be reused as sound barrier material in interior walls — even though not specified. But all too often, materials that could be used on the project are not viewed as a resource and are thrown into the bin.

Reuse should be viewed as a means of saving money for the builder and renovator.



RECYCLE

Recycling is the last of the three R's, and the last option that builders and renovators should consider. Recycling material means making new materials out of old ones. Any production process, however, will create new by-products that in turn become waste.

Still, recycling materials is superior to throwing them away, and recycling is consequently an important part of the waste reduction plan. After putting reduction and reuse principles into practice, anything left in the dumpster should be ripe for recycling.

Recycling also provides monetary benefits to the builder and renovator. Some "wastes" can be sold to recyclers. If recyclers charge to remove the waste, fees are generally less than at landfill sites. In some cases, if the amount of waste warrants it, recyclers will provide bins and haul the waste away free of charge.

In various parts of the country, asphalt, wood, drywall, cardboard, masonry, metals, glass and even plastics and paints can already be recycled. And the list of potential sources and uses of recycled materials grows daily.

As part of your Waste Management Planning, you need to know what materials can be recycled locally, and to keep abreast of new developments as new uses for old materials become more practical and widespread.

W C I WOOD CONVERSION INC
WOOD PROCESSING AND RECYCLING FACILITY
PARTICIPANTS:
The Regional Municipality of Peel
Ministry of the Environment
Federal Business Development Bank
University of Toronto (Forestry Dept.)
National Research Council

PUTTING A PLAN INTO ACTION

A successful waste management plan involves more than adding a couple of changes at the site. First, it needs to become a new way of looking at each aspect of work. And then, it needs to become second nature.

Getting to that stage requires a systematic approach to make sure that waste reduction becomes an intrinsic part of your company's procedures. The Plan should cover all aspects of your company's activities, and ultimately involve all members of your team, from workers at head office, to subs on the site. It is important to be thorough, to cover all the bases and involve all of the players. If you make waste management everybody's business, even small efforts will pay big dividends.

CHANGING SITE PROCEDURES

Of course, putting a waste management plan into practice will require some adjustments to your day-to-day operations. However, once these changes have been properly implemented, they will become a regular component of site management procedures.

The changes are not large, nor are they expensive. They will, however, require some thought and dedication — at least at the start. The biggest change will be how you handle waste as it's created, whether from demolition or construction operations. Waste cannot just be piled on the ground to be mixed with other wastes and then plowed into the ground or dumped.

NEW HOME CONSTRUCTION

Source separation is the key to efficient and effective waste management. Keeping wastes separate as they are produced, and storing the different waste streams independently is the single most important function. Wood will have to be piled with other wood waste; drywall with drywall waste; cardboard with cardboard waste; and so on down the line. Recyclers prefer and sometimes even demand *clean* waste. Also, if the waste can be sold, clean waste always brings a higher price. Source separation is simply good waste management practice.

Keeping wastes separate can be made easier by altering some operations as well. Wastes should be cleaned up as the different sub-trades move through the site — with source separation occurring on a smaller scale within each house. The common practice of randomly throwing garbage around the site must be discontinued if source separation is to be implemented.

Removing all wood wastes at the conclusion of framing will result in fewer piles of mixed garbage that will need to be hand separated. Having subs responsible for placing all of their wastes in separated piles at the end of each day will reduce the workload on your clean-up labour crew. For example, as noted earlier, a centralized cutting system on a multi-unit job keeps all wood waste in one spot.

Source separation will demand co-operation from trades. Responsibilities for clean-up procedures should be detailed in tendering and contract documents. In some areas of the country, sub-contractors assume responsibility for disposing of their wastes. At a minimum, consider requiring your subs to place their wastes in your separated bins. It's really just a matter of substituting one routine for another. In addition, source separation can actually work to everyone's benefit. A clean site is a safer site.

Individual bins will have to be provided for each kind of waste that you are producing in order to keep wastes separated, and make the job easier for haulers. The bins must be clearly labelled — identifying what materials go where. On smaller jobs, a single bin with a series of dividers can be used to keep wastes separate from each other.

Other ideas for altering operations will occur once you've got your waste management system up and running. Remember, construction waste management is in reality a leading-edge concept — and builders and renovators are responsible for inventing the procedures that will one day be common practice.

RENOVATION SITES

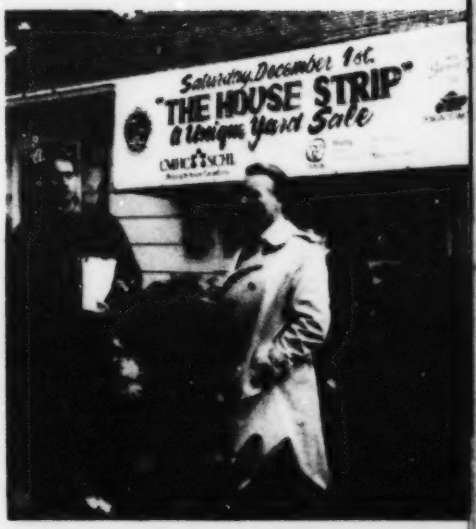
For renovators, source separation will also be a key to waste management on-site. Keeping wastes in separate bins will make the recycler's job easier. On renovations, small bins on wheels have been found to work well. The bins are kept near demolition locations, loaded, and emptied at the end of each working day.

Keeping wastes separate may mean making some minor changes to standard procedures — but those changes may also increase efficiency. For example, on each job site, designate a central area where all cutting is to take place. This will minimize waste, allow for better collection of waste wood, and make clean-up a faster operation.

Make use of as much reuse of demolition *waste* as you can: drywall pails, for example, can be used as tool caddies, and recovered plastic can be reused as garbage bags, or protection for materials. A pre-project waste inventory — looking at all potential waste before a demolition begins in order to determine whether materials will be reused or recycled — will help make waste management a smooth operation.

On a large demolition, try something along the lines of a house strip sale. With a strip sale, all demolition materials — from lamps and lumber to screws and nails — are sold, or given away for free, on the front lawn of the house under renovation. Running a strip sale will require some pre-planning, permission from clients, and a good hand at promotion. But the end result — no demolition waste to be hauled away — can be worth the effort.

As with all changes on site, your sub-trades will need to be brought on side. They will need to be briefed on new procedures, and be in agreement with the reasons behind the changes. You may even want to develop a policy requiring every sub-trade to manage their own wastes.



DEALING WITH CONTAMINATION

The main problem will be to keep the waste from being contaminated by outside personnel — especially after the job has closed down for the day. A surprisingly large segment of the population can't resist using a large waste bin. Bags of garbage inside an otherwise clean load can spoil the entire load.

Several building companies employ bins with *lockable* lids. The concept of a central, fenced-in waste management depot, located in a central location on an unused lot has been attempted with success. The concept of locking up your garbage is one whose time has come.

Building companies operating on larger projects can become even more proactive, and set up a *blue box* system for residents who move in early and do not have the luxury of garbage pick-up. While many builders don't think that they're in the garbage disposal business, when home-owner wastes are being thrown into their bins, that's really what they are doing.

DEALING WITH HAULERS

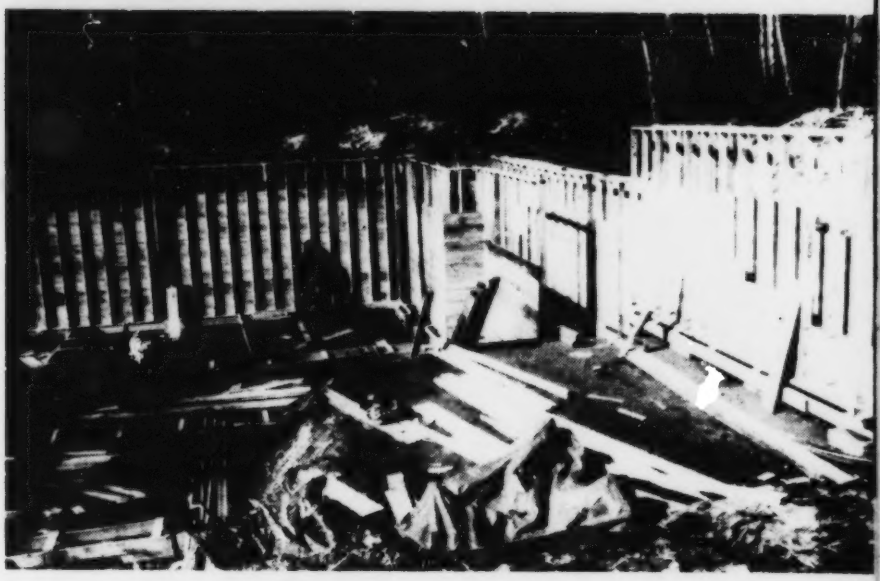
Historically, most building companies hire haulers on the basis of availability and price. The building company seldom questions the hauler's practices and pricing procedures. This historical laissez-faire policy must change. As with other industries, the building company — as the waste generator — is ultimately responsible for the disposal of the waste materials. In some municipalities, building companies have been fined for the actions of their haulers.

The builders must become more proactive in their relationship with haulers. Haulers need to be viewed in the same light as other subs — with the building company providing performance criteria. As prices for disposal increase, and as alternatives for recycling become more readily available, the building company should specify how, and where it wants its wastes disposed — and how it wants to see costs accounted, and invoices/waybills itemized.

Builders should also seek out haulers who are willing to work as a partner. A hauler who provides knowledge, experience and expertise can help the building company with its waste management programe. Many haulers are aware of the options available that can divert wastes from landfill and save disposal costs. It's in the best interest of the building company to find the hauler who will provide the best service.

IMPLEMENTING THE THREE R'S

LUMBER



Lumber represents the greatest component of the waste stream on both new housing and renovation sites. Off-cuts, warped lumber, discarded pallets and forming lumber that fill disposal bins pose more than a disposal problem. Wasted lumber represents a waste of our forest resources.

A Waste Management Action Plan will identify savings to the builder and renovator — savings in resources, savings in disposal costs and savings in your lumber purchases.

REDUCE

Reducing the amount of lumber wastage begins at the design stage. Designers, architects and builders should evaluate their plans in relation to the efficiency of lumber usage. Floor plans and house elevations should be reviewed to optimize use of subflooring and sheathing. Framing details should be amended to minimize unnecessary corner studs, excessive lumber at window and door openings and overbuilt lintels.

More efficient use of resources and reduced wastage can also result from changing practices. Modular wall panels, plywood I-beams and flooring underlay manufactured from recycled cardboard represent but a few resource-efficient options that can be considered at the design stage.

Detailed framing layouts will allow optimization of lumber through more accurate ordering. Ordering a 14' joist for a 12'3" span is a waste of money and resources. Pre-cut studs and joists will minimize wastage on-site.

Reduced wastage will also result from ordering kiln-dried lumber and improving lumber storage procedures on-site. Warped and twisted framing lumber is a common element in the disposal bin.

REUSE

On major renovation projects with a demolition component, perfectly good dimensioned lumber often finds its way into the bin and is trucked away — often just as new lumber is delivered to the site. An assessment of the reuse potential of lumber exposed during demolition

work can reduce the amount of new lumber needed for a project. Alternatively, sound older lumber can be sold and find its way into storage garages, barns, cottages or other structures.

Much waste results from simple procedural inefficiencies. Walk around a new house or renovation project at the framing stage; you're likely to find off-cuts in a variety of locations. By making all cuts at a central location, smaller lengths of lumber needed for cripples, lintels and blocking would be readily available — without cutting those specially ordered 16' joists. Where centralized cutting procedures have been put in place, lumber usage has been reduced by 15 percent — a significant savings when you consider an average lumber bill of around $9,000 per unit.

Off-cuts can have a number of alternative uses. For example, many builders find that they can supply their own requirements for bridging, blocking and backframing out of the off-cut pile. Pallets can be torn apart and reused as forming stakes.

Improved inventory and storage procedures can allow useful lumber to move from one project to another. When the pile is down to only a fraction of the typical waste, even the residue can be reused — as kindling, or if collected in large quantities as a fuel source for central heating facilities.

RECYCLE

Any wood products remaining on the construction or renovation site can be recycled. Commonly, recycled wood and forest product are the feedstock for pressed board, chipboard, pressed logs, animal bedding and landscape cover. Most wood grinders will accept wood with nails, staplers or fasteners. Companies operating mobile chippers are also worth approaching.

Contact your local Public Works department to find wood recyclers in your area.

DRYWALL

Drywall is another major component of the waste stream, representing as much as 1 pound of waste for each square foot of finished floor area. In many parts of the country, the drywall sub-contractor is responsible for disposal of wastes, minimizing the impact directly felt by the builder or renovator. While this practice results in the wastes being removed from the site, the wastage still ends up in the landfill unless it is recycled. Builders and renovators should specify waste management practices with their sub-contractors as part of their contract.

REDUCE

Reducing the amount of drywall waste can result from changes to design, ordering and installation procedures. Floor plans should be evaluated in relation to standardizing room sizes and minimizing off-cuts from board stock. Purchasing procedures should ensure that drywall orders are consistent with room dimensions. Drywall is available in a variety of stock sizes, and, in large quantities, can be specially ordered to suit custom designs.

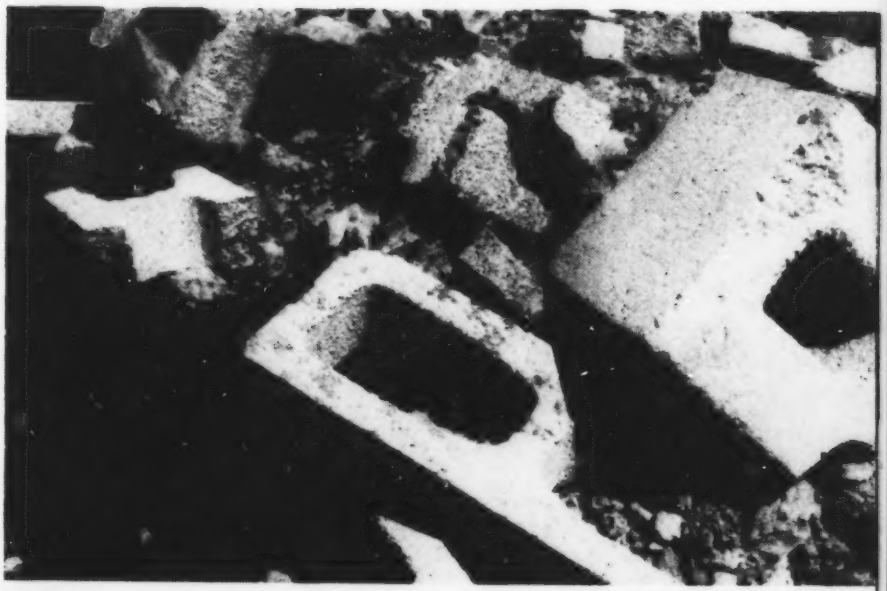
REUSE

Drywall can be reused within the building to increase thermal mass by storing off-cuts within the interior partition walls. While this practice can smooth temperature fluctuations within the house, the builder/renovator should consider implications for future rewiring or replumbing in determining the best location for placement of the board.

RECYCLE

Drywall recycling plants are now in operation in several parts of the country. Drywall can be reprocessed and used as a component — up to 15 percent — of new wallboard. Contact your local Public Works department to see if drywall recyclers exist in your area.

Because many of the paints used in housing are toxic, some of the recycling facilities accept only clean, unused drywall. You'll need to clarify the specific requirements for facilities in your area. If quantities are significant, drywall recyclers may pick up unused board from a central location.



MASONRY

Masonry represents the heaviest component of the waste stream. Rubble from concrete, concrete blocks, bricks and tile remnants are, in many cases, simply plowed into the ground. However, this practice is increasingly being discouraged and, in many instances, banned. When hauled to a landfill, it can cost plenty.

REDUCE

Reducing the amount of masonry materials commonly discarded on the construction site starts with improved take-offs and ordering procedures. In many cases, half skids of brick and block, and half boxes of tile are discarded. Residue concrete from forming is another needless waste. In British Columbia, residue concrete can be resold as block used in retaining walls.

REUSE

Masonry is a major component of the demolition waste stream in many parts of the country. Infill developments often require the demolition of older underutilized buildings. The stone, brick, block and concrete in these buildings represent a costly resource. In many locations in the country, stone crushers are operating. This machinery can take masonry materials and crush them into an aggregate form for use in road building. On large demolition projects, an on-site mobile crusher may be economical.

Unused brick and block is commonly left lying around the site. The longer the material remains unattended, the deeper into the mud it will go! Site clean-up procedures should be performed on a daily basis — with masonry materials being separated into a centralized pile or bin. Whole blocks or bricks should be stored in a central location.

With improved inventory and storage procedures, leftover materials from one site can be reused on another site. Excess brick from one or several projects can be reused as part of a fireplace or chimney on another project.

CARDBOARD AND PAPER

Cardboard, while not a heavy item, represents a much higher component of the waste stream on a volume basis — a factor, when considering bin costs and landfill capacity. The banning of cardboard from landfills has been in place in many municipalities for a number of years.

Cardboard boxes are used to ship everything from skylights through to the kitchen sink — and as a container for nails and drywall mud. Kraft paper wrapping is found on bundles of asphalt shingles, Portland cement, or as packaging for carpets.

REDUCE

Most cardboard waste and kraft paper found in the disposal bin is a result of packaging — or over-packaging as the case may be. Purchasing articles in bulk containers when possible can significantly reduce waste volumes.

Specify in your purchase orders that suppliers deliver goods with a minimum of packaging — or alternatively, that they are responsible for taking the packaging away after delivery. This will require a well-timed construction process to avoid having articles on the site for too long where the chance of damage can occur.

RECYCLE

Corrugated cardboard is extensively recycled. The main product made of recycled corrugated cardboard is boxboard (up to 50 percent recycled content). Recycled corrugated cardboard also forms a part of a number of other products such as cores for carpet rolls, and parts of new corrugated cardboard. It is also being recycled as a component of building products, including drywall paper, fibreboard, and floor underlay. **Note**: drywall boxes, with the plastic mud bag removed, can also be recycled.

A large number of recycling companies will remove cardboard wastes and clean kraft paper, if quantities justify. Some companies will provide storage bins to the site.

METAL AND APPLIANCES

Metal represents the easiest component of the waste stream to eliminate. At the demolition stage, cast iron piping and radiators, old copper piping, aluminium siding and old appliances are commonly removed. During new construction, metal wastes include plumbing and sheet metal wastage, banding used in transporting wood, flashing, eavestrough and siding wastes, and bent or dropped fasteners.

REDUCE

Reducing the amount of metal wastage finding its way into the disposal bin can include requiring sub-trades to take away their own wastes. This might also improve efficiency on the part of some trades.

REUSE

Appliances are something that every renovator has to deal with. Most commonly, they can be brought to salvage yards, or, where it can be arranged, they can be sold by the renovator as part of a House Strip Sale.

RECYCLE

Metal is commonly recycled through scrap dealers. They'll usually pick-up scrap metal if quantities are adequate.

PLASTICS AND VINYL

Plastics represent an increasingly larger portion of waste volumes. The main problem with landfilling plastics is that they do not biodegrade. The plastic you throw out today will still be around for hundreds, if not thousands, of years.

Plastics appear in the disposal bin from a variety of sources. As a packaging material, plastic is often found on skids of brick, and foam and glass-fibre wrapping. Excess polyethylene is another common source.

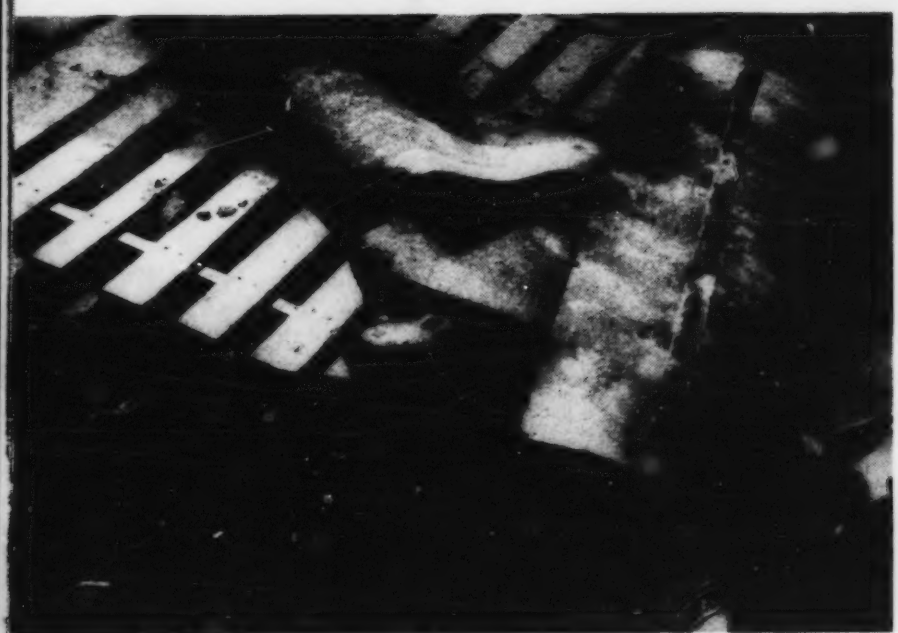
On the demolition/renovation site, vinyl siding and eavestrough, vinyl flooring and other plastics appear regularly.

RECYCLE

Recycling plastics has been, until recently, a difficult and costly process. Many plastic products are composed of various types of plastics that are difficult to separate. The problem is that when one kind of plastic is recycled, the chemical structure of the other plastics is changed, rendering them useless for most applications.

However, given the enormous amount of plastic waste, a large sum of research and development dollars have been poured into plastic recycling with good results. Recycled plastics are now used as components of numerous products, such as garbage bags, composters and castors. Products that use recycled plastics which should be of interest to builders and renovators include: drainage tile, sump liners and even wood substitutes.

A note on recycled plastics: Plastic waste, in particular, needs to be extremely 'clean' or the load is spoiled. In addition, the amounts of plastic waste generally need to be substantial before recyclers will arrange to pick-up the load. Such specifics need to be worked out with individual recyclers.



SHINGLES

To date, asphalt shingles have not been recycled to any large degree. However, bans on the dumping of asphalt has prompted a search for alternative disposal techniques and uses. Some of these are detailed below. As always, however, more efficient use of the primary materials remains the primary goal of the waste management strategy.

RECYCLE

Several initiatives to recycle asphalt shingles are already underway. The primary use for recycled shingles is as an additive to road paving asphalt. In the U.S., at least one company makes a road paving alternative composed almost entirely of recycled shingles. The incentive for contractors to recycle their shingles lies in the company's small tipping fee. According to company officials, a contractor can save over $1,000 on the renovation or demolition of an average residential roof.

INSULATION

Insulation, in all shapes and sizes, is a common addition to the disposal bin. Off-cuts from rigid board insulating sheathing, foundation insulations, and glass fibre batts typically amount to five percent of total construction wastes.

REUSE

Excess insulation should become a contradiction in terms. There should be no excuse for throwing out scraps of additional insulation. Batt-type insulation should be added to attics. Rigid and semi-rigid board can be added to interior walls to act as soundproofing. Again, the builder/renovator should give some thought to potential future rewiring or replumbing in determining the best location for placement of the insulation scraps.

RECYCLE

Initiatives are currently underway to integrate clean foam insulations with the construction site. Manufacturers of both expanded and extruded polystyrene foam insulations are investigating larger scale recycling options. Clean board stock will be a requirement of these initiatives.

PAINTS, SOLVENTS AND SEALANTS

Paints, solvents, and sealants all classify as hazardous waste — with surface coatings accounting for 70 percent of the total of *household* hazardous waste. Unless disposed of properly, they can leak damaging substances into the ground, groundwater, and the atmosphere for decades. Even hazardous wastes disposed of 'properly' implies that excess supplies have been purchased and poorly used.

REDUCE

Reduce waste through bulk purchasing and better storage.

REUSE

Use leftover paint as a primer coat on future paint jobs.

RECYCLE

Paint is by far the biggest culprit that needs to be dealt with. Alkyd and latex paints represent 80 percent of the waste surface coatings. Paint recycling facilities are now in place in several municipalities across the country, including Vancouver, Regina, Winnipeg, Toronto and Montreal. Because of the volumes of waste paints produced, it is anticipated that many more municipalities will bring facilities online in the near future. The waste alkyd and latex paints are recovered and converted into materials that meet or exceed the quality and performance of commercially available paint products — and are safe for use.

INTO THE FUTURE

At present, the concept of construction waste management is in its relative infancy. However, given the landfill problems plaguing municipalities across the country, and the aggressive nature of their response through restrictions and bans on the dumping of construction and demolition waste, there can be little doubt that the waste management industry will come of age in a few short years. This section examines some of the trends already emerging that will carry the industry into the future.

Under the heading **reduce**, we'll likely see, in the next few years, a host of new construction practices targeted at more efficient use of materials. This will run the gamut from innovative detailing techniques, such as improved lintel designs, and greater use of pre-fab materials, to entirely new approaches to the construction process. Already, the concept of centralized cutting has been put into practice, and achieved significant savings in lumber costs.

The most important aspect here will be a need for information transfer and dissemination. Building on the work of others, and sharing the results, will help the industry as a whole reduce its burden on landfills across the country.

We'll also see the manufacturers of construction materials move aggressively into the marketing of less wasteful products, and products with less packaging. Already, a number of these products are available, such as bulk caulking, and many more should be available soon. (Builders and renovators can help this process along, by demanding products that are less wasteful in nature.) Again, the importance of keeping track of new developments will be paramount.

Under **reuse**, the story will be much the same. Individually, builders and renovators will discover new ways to reuse materials traditionally thrown away. Sharing the results of

these innovations will aid other builders and renovators, as well as the industry as a whole.

Pooling waste resources is an idea that has been tried successfully and could become a commonplace practice in the next few years. Pooling resources involves getting together with other builders or renovators and storing *waste* at a common location. These resources can then be diverted to different jobs, or, sold for profit.

Recycling, while the least desirable of the three R's, will likely see the greatest developments, at least over the short term. As tipping fees continue to increase, and restrictions and bans on construction/demolition (C/D) waste continue to mount, the decision to build an industry around recycled materials will become economically attractive. As a consequence, more specialized equipment for recycling, and more specialized recycled materials will begin to appear on the scene. Already, plastics are being recycled into numerous products that have construction applications—from drainage tiles, to sump liners, to wood substitutes. Look for asphalt shingles to be next on the list of banned materials, and high on the list of the recycling industry as road base.

Already, in some larger centres, we are seeing a move towards facilities that can take and sort mixed waste, which improves the chances of materials being recycled as opposed to wasted.

However, for most builders and renovators wishing to recycle materials, source separation will remain the preferred route. The economics of recycling, from the recycling plants point of view, are more attractive when the material is *clean*. Those benefits will also be passed on to the builder or renovator bringing in the material.

As always, builders and renovators will need to keep abreast of changes in a constantly shifting regulatory environment. In fact, keeping ahead of expected changes will serve your company well. Action, as opposed to reaction, will be the call word of the waste management industry.

Finally, as consumer concerns for the environment as a whole continue to grow, the construction industry will come under close scrutiny. Being *green* can and should become part of every builder and renovators marketing plan.

FURTHER RESOURCES

PERIODICALS

Resource Recycling
North America's Recycling Journal
P.O. Box 10540
Portland Oregon, 97210
(503) 227-1319

ORGANIZATIONS

• Contact your local BUILDERS' ASSOCIATION for regional specific waste reduction opportunities.

• Non-profit RECYCLING COUNCILS exist in many provinces and provide a valuable source of recycling information and resources.

• ENVIRONMENTAL ORGANIZATIONS can provide both information on waste reduction and other *greening* initiatives in your locality.

MUNICIPAL RECYCLING

Most municipalities have recycling departments; contact your local Public Works department for further information.

OTHER

CANADIAN WASTE EXCHANGE
2395 Speakman Drive
Mississauga, Ontario
L5K 1B3
(416) 822-4111 ext. 656

The waste exchange matches a wide variety of reuseable construction and other wastes with companies and facilities that can use them.

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